

I CLAIM:

1           1.    A method of making a colored automotive trim  
2   product comprising the steps of:  
3                extruding an approximately planar sheet including  
4   at least a colored layer, the color layer including color  
5   pigment material and metallizing material therein;  
6                positioning the approximately planar sheet in a  
7   vacuum-forming apparatus;  
8                vacuum-forming the sheet into a three-  
9   dimensionally shaped preform;  
10               providing the preform in a cavity of an injection  
11   molding apparatus;  
12               injecting heated semi-molten or flowable material  
13   into the cavity of the injection molding apparatus so that  
14   the semi-molten material bonds to the preform to form a  
15   three-dimensionally shaped article;  
16               removing the shaped article from the injection  
17   molding apparatus; and  
18               using the shaped article as at least part of an  
19   exterior trim product for a vehicle.

1           2.    The method of claim 1, wherein said extruding  
2   step further comprises extruding the approximately planar  
3   sheet so as to include the color layer and a clear coat  
4   layer that is substantially transparent to visible light.

1           3.    The method of claim 2, wherein said extruding step  
2 further comprises extruding the approximately planar sheet  
3 so as to include the color layer, the clear coat layer, and  
4 a tie layer located between the color layer and the clear  
5 coat layer.

1           4.    The method of claim 2, wherein said extruding  
2 step further comprises extruding the approximately planar  
3 sheet so as to be inclusive of the color layer, the clear  
4 coat layer, and a tie layer, wherein the color layer is  
5 disposed between the tie layer and the clear coat layer.

1           5.    The method of claim 1, further comprising the step  
2 of laminating a clear coat layer on the color layer after  
3 said extruding step so that the sheet positioned in the  
4 vacuum-forming apparatus includes the color layer and the  
5 clear coat layer.

1           6.    The method of claim 5, wherein said laminating  
2 step includes at least one of: (i) laminating the clear coat  
3 layer directly on the first layer so that the color and  
4 clear coat layers contact one another; and (ii) laminating  
5 the clear coat layer on the color layer with a tie layer  
6 disposed between the color and clear coat layers.

1           7. The method of claim 1, wherein said extruding step  
2 includes extruding the sheet so that the sheet includes the  
3 color layer, a first tie layer on a first side of the color  
4 layer, a second tie layer on a second side of the color  
5 layer, and a substantially transparent layer on the first  
6 side of the sheet, whereby the first tie layer is disposed  
7 between and promotes bonding of the color layer and the  
8 substantially transparent layer.

1           8. The method of claim 1, wherein said extruding step  
2 includes extruding the sheet so that the sheet includes the  
3 color layer and a first tie layer on a first side of the  
4 color layer; and

5                   the method further comprising the step of  
6 laminating a second tie layer and a substantially  
7 transparent layer on a second side of the color layer  
8 following said extruding step, so that the second tie layer  
9 promotes bonding of the substantially transparent layer to  
10 the color layer.

1           9. The method of claim 1, wherein the metallizing  
2 material is approximately uniformly distributed throughout  
3 the color layer, and the metallizing material includes at  
4 least one of: metallic flake pigments, aluminum flakes,  
5 nickel flakes, nickel-chrome flakes, and mica flakes.

1           10. A method of making a colored automotive trim part  
2 comprising the steps of:  
3           providing an at least partially extruded sheet  
4 including at least an extruded color layer including color  
5 pigment and metallizing particles;  
6           providing the sheet in a cavity of an injection  
7 molding apparatus;  
8           injecting semi-molten material into the cavity of  
9 the injection molding apparatus so that the semi-molten  
10 material bonds to the sheet to form a three-dimensionally  
11 shaped article;  
12           removing the shaped article from the injection  
13 molding apparatus; and  
14           using the shaped article as, or in the manufacture  
15 of, an exterior trim part for a vehicle.

1           11. The method of claim 10, wherein said injecting  
2 step further comprises injecting the semi-molten material  
3 into the cavity of the injection molding device so that the  
4 semi-molten material deforms the sheet into the three-  
5 dimensionally shaped article.

1           12. The method of claim 10, wherein said providing an  
2 at least partially extruded sheet step further includes  
3 providing the sheet so that the sheet includes the color  
4 layer, a first tie layer, and a substantially transparent

5 layer, wherein the first tie layer is disposed between the  
6 color layer and the substantially transparent layer.

1 13. The method of claim 12, wherein said providing an  
2 at least partially extruded sheet step further includes  
3 providing the sheet so that the sheet includes a second tie  
4 layer, wherein the color layer is located between the first  
5 and second tie layers.

1 14. The method of claim 13, wherein said providing an  
2 at least partially extruded sheet step further includes  
3 providing the sheet so that the sheet includes a removable  
4 protective layer, wherein the substantially transparent  
5 layer is located between the removable protective layer and  
6 the color layer.

1 15. A method of making an article for use in the  
2 manufacture of a colored exterior vehicle trim part, said  
3 method comprising the steps of:

4 providing a sheet including an extruded color  
5 layer, the extruded color layer including color pigment  
6 material to color the sheet and metallizing material  
7 substantially uniformly distributed throughout the color  
8 layer;

9 thermo-forming the sheet into a three-  
10 dimensionally shaped preform so that the preform is shaped

11 so as to approximately match in shape a contour of at least  
12 a portion of a die of an injection molding apparatus;  
13 providing the preform in a cavity of the injection  
14 molding apparatus;  
15 injecting heated flowable material into the cavity  
16 of the injection molding apparatus so that the heated  
17 flowable material bonds to the preform in the cavity to form  
18 a three-dimensionally shaped colored article; and  
19 removing the shaped colored article from the  
20 injection molding apparatus.

1 16. The method of claim 15, further comprising the  
2 steps of:

3 providing the sheet with the color layer, a  
4 substantially transparent layer, and a first tie layer  
5 disposed between (i) the color layer, and (ii) the  
6 substantially transparent layer.

1 17. The method of claim 16, further comprising the  
2 step of providing the sheet with the color layer, the  
3 substantially transparent layer, the first tie layer, and a  
4 second tie layer, wherein the first and second tie layers  
5 are on opposite sides of the color layer.

1 18. An automotive trim part comprising:  
2 an injection molded base substrate;

3 a layer system on said base substrate; and  
4 wherein said layer system includes an extruded  
5 colored layer including color pigment material and  
6 metallizing particles therein.

1 19. The trim part of claim 18, wherein said layer  
2 system further comprises a substantially transparent layer,  
3 and wherein said extruded colored layer is located between  
4 said substantially transparent layer and said base  
5 substrate.

1 20. The trim part of claim 19, wherein said layer  
2 system further comprises a first tie layer disposed between  
3 said substantially transparent layer and said extruded  
4 colored layer.

1 21. The trim part of claim 20, wherein said layer  
2 system further comprises a second tie layer disposed on a  
3 side of said colored layer opposite said first tie layer, so  
4 that said second tie layer promotes bonding of said base  
5 substrate to said colored layer.

1 22. The trim part of claim 21, wherein said first and  
2 second tie layers are formed by extrusion along with said  
3 colored layer.

1           23. A method of making a colored automotive trim  
2 product comprising the steps of:  
3           providing a sheet including at least a colored  
4 layer, the color layer including coloring material therein;  
5           positioning the sheet in a vacuum-forming  
6 apparatus;  
7           vacuum-forming the sheet into a three-  
8 dimensionally shaped preform;  
9           providing the preform in a cavity of an injection  
10 molding apparatus;  
11           injecting heated semi-molten or flowable material  
12 into the cavity of the injection molding apparatus so that  
13 the semi-molten material bonds to the preform to form a  
14 three-dimensionally shaped article;  
15           removing the shaped article from the injection  
16 molding apparatus; and  
17           using the shaped article as at least part of an  
18 exterior trim product for a vehicle.

1           24. An automotive trim part comprising:  
2           a molded base substrate;  
3           a layer system on said base substrate; and  
4           wherein said layer system includes an extruded  
5 colored layer including color pigment material therein.

1           25. An automotive trim part comprising:



2 a molded base substrate;  
3 a layer system on said base substrate; and  
4 wherein said layer system includes an extruded  
5 colored layer including color pigment material and a  
6 plurality of different types of metallizing particles  
7 therein.

1 26. The trim part of claim 25, wherein the colored  
2 layer includes a first group of said metallizing particles  
3 of a first shape and a second group of said metallizing  
4 particles of a second shape different than the first shape.

1 27. The trim part of claim 25, wherein the colored  
2 layer includes a first group of said metallizing particles  
3 of a first material and a second group of said metallizing  
4 particles of a second material different than the first  
5 material.

1 28. A method of making an article for use in the  
2 manufacture of a colored exterior vehicle trim part, said  
3 method comprising the steps of:

4 extruding a polymer-based material including color  
5 pigment material and a plurality of different types of  
6 metallizing particles therein so as to form an extruded  
7 sheet including an extruded color layer;

8 thermo-forming the sheet into a three-  
9 dimensionally shaped preform so that the preform is shaped  
10 so as to approximately match in shape a contour of at least  
11 a portion of a die of an injection molding apparatus;  
12 providing the preform in a cavity of the injection  
13 molding apparatus;  
14 injecting heated flowable material into the cavity  
15 of the injection molding apparatus so that the heated  
16 flowable material bonds to the preform in the cavity to form  
17 a three-dimensionally shaped colored article; and  
18 removing the shaped colored article from the  
19 injection molding apparatus.